

REMARKS:

Claims 8-16 remain in the application for consideration by the examiner. The Official action set forth three different prior art rejections. The first was a rejection of claims 8 and 11 under 35 U.S.C. § 102(e) as being anticipated by U.S. patent No. 6,154,470 of Basting *et al.* (Basting). This rejection is set forth on pages 2 and 3 of the Official action. In the second rejection, claim 8 was rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. patent No. 5,303,254 of Szatmari. This rejection is set forth on page 3 of the Official action. In the third rejection, claims 8-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent No. 4,856,018 of Nozue *et al.* (Nozue) in view of U.S. patent No. 5,642,374 of Wakabayashi *et al.* (Wakabayashi). This rejection is set forth on pages 4 through 7 of the Official action. Additional comments were set forth on pages 7-9 of the Official action in the section entitled "Response to Arguments."

Applicant respectfully submits that the teachings of Basting, Szatmari, Nozue, and/or Wakabayashi cannot disclose or suggest the invention as set forth in any of the present claims within the meaning of 35 U.S.C. § 102 or 35 U.S.C. § 103. Many of the factual statements set forth in the outstanding Office action concerning the teachings of the cited references, knowledge or skill of those skilled in the art, and motivations of those skilled in the art based on the cited teachings are not correct. In order to establish the knowledge, understandings, and motivations of one of ordinary skill in the art based on the

teachings cited in the outstanding Office action, applicant is attaching hereto a Rule 132 declaration of Dr. Osamu Wakabayashi (hereinafter referred to as the "Wakabayashi declaration"). Dr. Wakabayashi is an expert in the field of laser technology, who worked in the area of laser design for almost 20 years and was an inventor in two of the U.S. patents cited against applicant's claims. As explained in the case of *In re Carroll*, 601 F.2d 118, 202 USPQ 571 (CCPA 1979), expert opinion in the form of a Rule 132 declaration of what the prior art taught prior to the making of the claimed invention must receive considerable deference by the examiner. For these reasons, applicant respectfully requests that the Wakabayashi declaration be entered under the provisions of 37 C.F.R. § 1.116(b) for the purposes of placing the application in condition for allowance or for the purposes of appeal.

As explained in the telephone and personal interviews conducted with the examiner during the prosecution of this application; in the presently claimed invention, the bandwidth of the oscillation beam of laser light is controlled by reducing the total pressure of the laser gas in a fluorine laser without use of an optical element for further narrowing the bandwidth of the oscillation laser light. As shown in figure 2 of the present application, as the total gas pressure (atm) is reduced from a value of about 4 atm, the bandwidth is narrowed in a fluorine laser, and at a total laser gas pressure of about 2.8 atm, the bandwidth is about 0.6 pm. No teaching cited against applicant's claims remotely contemplates any relationship concerning the lowering the

total laser gas pressure from a value of about 5 atm, which is normally used for laser oscillation in fluorine lasers, to a lower value, such as about 2.8 atm, for reducing bandwidth of laser light as required in the present claims.

The Official action noted Basting at column 2, lines 30-34; column 6, lines 8-10; and column 8, lines 54-57. Perhaps, the most pertinent of these portions of Basting is the discussion at column 2, lines 30-34, concerning a total pressure of less than 5 bars. As explained in the attached Wakabayashi declaration, the Basting patent at column 8, lines 54-56, describes that fluorine lasers can typically operate at a total pressure of approximately 5 bars (4.93 atm). This total pressure for fluorine lasers is higher than that typically used for KrF- and ArF-excimer lasers. The attached Wakabayashi declaration continued that while the Basting patent describes a total pressure of less than 5 bars at column 2, lines 29-34, those persons skilled in the art realize that this means a total pressure of slightly less than 5 bars, and certainly nothing lower than 4.8 bars (4.74 atm). Finally, the attached Wakabayashi declaration explains that there is no reason provided in the Nozue, Szatmari, Wakabayashi and Basting patents that would motivate the undersigned declarant, in his opinion as one of ordinary skill in the art, to operate a fluorine laser at a total pressure markedly lower than the amount of approximately 5 bars (4.93 atm) for fluorine lasers as described in the patent to Basting, such as that the 2.8 atm required in the presently claimed invention.

Based on what the teachings of Basting convey to one of ordinary skill in the art and the understanding and skill of one of ordinary skill in this art, as exemplified in the statements in the Wakabayashi declaration, it is impossible for one of ordinary skill in the art to be motivated from the teachings of Basting to use a total pressure of 2.8 atm or lower for laser gas in a fluorine laser, as required in the presently claimed invention. For these reasons, it is impossible for the teachings of Basting to remotely contemplate or suggest the invention as set forth in present claim 8. Therefore, applicant respectfully requests that the examiner reconsider and withdraw the rejection of claim 8 over the teachings of Basting.

With respect to Szatmari, applicant respectfully submits that these teachings are not pertinent to the presently claimed invention. The teachings of Szatmari are concerned with the KrF excimer laser, while the presently claimed invention is directed to a fluorine laser. On the other hand; as known by those skilled in the art, and as described in the specification of this application, the spectrum profiles output by these different lasers are completely different. In the presently claimed fluorine laser, the width of a spectrum line can be maintained at 1pm or lower without use of a line-narrowing device. But for the KrF excimer laser such as proposed by the teachings of Szatmari, a width of a spectrum line is a few hundred pm (i.e., 300 pm) without use of a line-narrowing device. Thus, within the teachings of Szatmari, one of ordinary skill in the art would understand that it is impossible

to make the width less than 1 pm without using an optical element such as a prism or a grating.

In response to the foregoing arguments, the Official action stated that claim 8 is not limited to only molecular F<sub>2</sub>. This statement demonstrates a fundamental misunderstanding of the terminology used in the laser art with respect to applicant's claims and a fundamental misunderstanding of basic U.S. Patent law. Claim 8 defines an ultra-narrowband "fluorine laser" apparatus. It is understood by those skilled in this art that a "fluorine laser" uses a laser gas that only includes fluorine as a reactive gas, and the laser gas does not contain the rare gases of Kr and Ar. As explained in the Wakabayashi declaration and as explained applicant's specification disclosure, in the area of laser technology, the identifications of "KrF-excimer lasers," "ArF-excimer lasers," and "fluorine lasers (F<sub>2</sub>-lasers)" are well-established and refer to different technologies. Dr. Wakabayashi continued that, in particular, "fluorine lasers" function and operate differently from a KrF-excimer lasers and ArF-excimer lasers and the identity and names of these different types of lasers devices have established an exclusive identity in the art. For these reasons, in the opinion of Dr. Wakabayashi, when one of ordinary skill in the art describes a "fluorine laser," those persons skilled in the art understand that the laser is operated only with fluorine gas as a reactive gas and the laser gas does not contain the rare gases of Kr and Ar, which are respectively contained in the laser gas of KrF- and ArF-excimer lasers.

In response to applicant's argument that figure 5 of Szatmari shows an amplifier device, in the "Response to Arguments" section of the Official action, the examiner stated that the device of Szatmari can be used as an oscillator, which is the device that applicant use to narrow the beam width of laser light. Applicant's claims do not define the use of an oscillator to narrow beam width. Accordingly, any teachings in Szatmari to this effect are irrelevant to the patentability of applicant's claimed invention. On the other hand, applicant's claims define controlling the total pressure of laser gas in a fluorine laser to narrow the bandwidth of laser light. The teachings of Szatmari simply do not show this.

For such reasons, applicant respectfully submits that the teachings of Szatmari cannot motivate one of ordinary skill in the art to the invention as set forth in the present claims that define an ultra-narrowband "fluorine laser" apparatus, where the bandwidth of laser light is narrowed to a desired value by maintaining total pressure of the laser gas equal to or lower than 2.8 atm, such as required in independent claims 8 and 9.

There is no description about a width of a spectrum line itself, or the width of a spectrum line relative to total gas pressure, at the portions of Szatmari cited in the outstanding Office action (especially at column 6, lines 8-10). Therefore, these teachings cannot contemplate or suggest the invention as set forth in any of the present claims, which require a bandwidth of 0.6 pm (claim 10) or 0.2 to 0.3 pm (claims 15 and 16).

Concerning the teachings of Nozue and Wakabayashi, in this combination rejection the Official action acknowledged that Nozue does not contemplate or suggest the limitation of controlling the total pressure of the laser gas to about 2.8 atm or lower so that the bandwidth of the laser gas light oscillated by the laser chamber is narrowed to a desired value. The Official action cited the teachings of Wakabayashi as suggesting a general teaching of controlling the total pressure of the laser gases in such a way that the beam profile is shaped as desired. The Official action concluded that it would have been obvious to one of ordinary skill in the art to control the total pressure of the laser gas to about 2.8 atm or lower, because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art.

Applicant respectfully submits that it is impossible for one of ordinary skill in the art to be motivated to the presently claimed invention based on the teachings of Nozue and Wakabayashi, both of which require the use of optical devices for narrowing the width of the laser light beam therein.

A significant difference between the Wakabayashi patent and the presently claimed invention can be explained by the different terminologies used in the Wakabayashi patent and those used in the presently claimed invention. As explained in the Wakabayashi declaration, the Wakabayashi patent proposes controlling beam width. A beam or a light beam (beam of light) is a column of light (as from a beacon) or a shaft of light. Such a beam or light

beam includes a plurality of wavelengths of light with a wide range of wavelengths that need not be adjacent wavelengths. On the other hand, the presently claimed invention is directed to controlling bandwidth, such as a very narrow range light wavelengths of adjacent wavelengths, or an adjacent portions thereof, or possibly a single wavelength of light. Dr. Wakabayashi continued that since the teachings of the Wakabayashi patent (i.e. beam width) and the claims of present application (i.e. bandwidth) are directed to controlling different types of light and wavelengths structures, in his opinion, one of ordinary skill in the art would not be motivated to utilize the procedures of the Wakabayashi patent (concerning, for example, beam width) for the different light and wavelength structure (i.e., bandwidth) defined in the claims of the present application. A reason for this, in the opinion of the undersigned Dr. Wakabayashi, is that one of ordinary skill in the art would not expect that the procedures, such as controlling total pressure of gas in the laser chamber, as discussed in the Wakabayashi patent for controlling beam width in KrF- and ArF-excimer lasers would function or operate in a similar manner for the different light and wavelength structure (i.e., bandwidth) defined in the claims of the present application directed to a fluorine laser apparatus.

In the attached rule 132 declaration, Dr. Wakabayashi further explained that when KrF-and ArF-excimer lasers are oscillated, the output spectrum width is about 300 pm, and this spectrum width includes a wide range of wavelengths. This understanding is consistent with the teachings of the



Basting patent, which describes that KrF- and ArF-excimer laser systems have a breadth of natural emission spectra that is greater than 100 pm. For these reasons, in his opinion as one of ordinary skill in this art, Dr. Wakabayashi declares that it is impossible for the teachings of the Wakabayashi patent to suggest controlling the width of the laser beam to anything significantly less than about 300 pm, and that these teachings certainly cannot suggest that it is possible within the teachings of the Wakabayashi patent to control the bandwidth of a laser light to lower than 1 pm, as required in the invention claimed in the present application without the use of optical elements (i.e., gratings and/or prisms). Therefore, the teachings of Wakabayashi patent would not have motivated Dr. Wakabayashi, in his opinion as one of ordinary skill in the art, to the presently claimed invention that includes narrowing the bandwidth of laser light to lower than 1 pm by maintaining total pressure of the laser gas equal to or lower than 2.8 atm. On the other hand, if the total pressure of the laser gas in the device proposed by Wakabayashi was maintained equal to or lower than 2.8 atm; it is Dr. Wakabayashi's opinion, as one of ordinary skill in the art, that the bandwidth of the resulting laser beam could not remotely approach 1 pm or lower, as required in the presently claimed invention.

In the attached Wakabayashi declaration, Dr. Wakabayashi further stated that the Wakabayashi patent cannot suggest to an artisan in this art that the laser described therein can be operated in a manner to control the

bandwidth of a fluorine laser gas to a very narrow bandwidth, such as to about 1 pm or lower without use of an optical element(s). Dr. Wakabayashi explained that the reasons for this would include the fact that the laser beam proposed by the device of the Wakabayashi patent has a spectrum width of about 300 pm and includes a wide range of wavelengths. In addition, Dr. Wakabayashi stated that, in his opinion, one of ordinary skill in the art would not operate a fluorine laser at a total pressure of 2.8 atm, as required in the presently claimed invention, based on the discussions in the Wakabayashi patent or based on the general knowledge in this art, because no known advantage can be obtained from this.

From the statements in the Wakabayashi declaration, it is readily apparent that the teachings of Wakabayashi cannot possibly motivate one of ordinary skill in the art to the invention as set forth in the present claims for operating a fluorine laser at a total pressure of 2.8 atm. The teachings of Nozue do not contemplate or suggest the limitation of controlling the total pressure of the laser gas to about 2.8 atm or lower, so that the bandwidth of the laser gas light oscillated by the laser chamber is narrowed to a desired value. This was acknowledged in the final Office action. Therefore, applicant respectfully submits that the combined teachings of Nozue and Wakabayashi cannot contemplate or suggest operating a fluorine laser at a total pressure of 2.8 atm and/or controlling the bandwidth of a laser light in a fluorine laser to lower than 1 pm by total pressure of laser gas. Accordingly, applicant

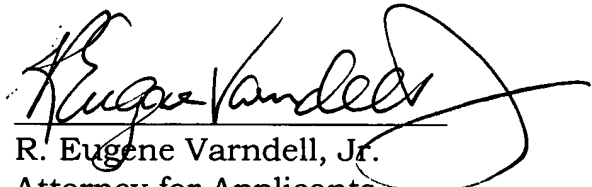
respectfully submits that the presently claimed invention is distinguishable from the teachings of Wakabayashi and Nozue. Therefore, applicant respectfully requests that the examiner reconsider and withdraw this rejection.

From the above, it is readily apparent that the teachings of Basting, Szatmari, Nozue, and/or Wakabayashi cannot disclose or suggest the invention as set forth in any of the present claims within the meaning of 35 U.S.C. § 102 or 35 U.S.C. § 103(a). Therefore, applicant respectfully requests that the examiner reconsider and withdraw all the rejections of the pending claims that were set forth in the outstanding Office action.

In view of the foregoing amendments and remarks, favorable consideration and allowance of claims 8-16 are respectfully requested. While it is believed that all the claims in this application are in condition for allowance, should the examiner have any comments or questions, it is respectfully requested that the undersigned be telephoned at the below listed number to resolve any outstanding issues.

In the event this paper is not timely filed, applicant hereby petitions for an appropriate extension of time. The fee therefor, as well as any other fees which become due, may be charged to our deposit account No. 22-0256.

Respectfully submitted,  
VARNDELL & VARNDELL, PLLC  
(Formerly Varndell Legal Group)

A handwritten signature in black ink, appearing to read "R. Eugene Varndell, Jr.", is written over a horizontal line. The signature is stylized with a large, sweeping loop at the end.

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